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REPLY TO
STAT ATTN OF:

28 September 1973

SUBJECT: Letter of Appreciation

TO: Rear Admiral H. G. Stoecklein MSC, USN
Dir/CO Naval Regional Medical Center
San Diego, California 92134

The Physiological Training Division, Miramar NAS, is to be commended for its support of a training program recently conducted by and for officers assigned to this organization. Commander Passoglia and his personnel provided competent and professional support as well as a friendly and courteous working environment. Special recognition should be afforded MMC/SS W. D. Kempfer who served as safety diver throughout the three-day period, and to Mr. H. Johnston and Mr. W. Oslin, Engineering Technicians, who operated the training device. The Miramar NAS Physiological Training Unit is a credit to their station and the USN Physiological Training Program. Please convey this organization's thanks for a job well done.

15/
WENDELL L. BEVAN, JR.
Brig Gen USAF
Director of Special Projects
Central Control Group

Navy review(s) completed.

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BLUE GULL BRIEFING

- I. BRIEF FIRE CREW: P.E.
 - A. Canopy Removal
 - B. Initiator Hose Location
 - C. How to Extract the Pilot
- II. BREF HELICOPTER CREW: P.E.
 - A. How to Extract the Pilot
- III. LOW FLIGHT - PRIOR TO DECK CONTACT
 - A. Oxygen Mask On
 - B. Oxygen On
 - C. Canopy Seals On
 - D. All Safety Pins Out
 - E. Shoulder Harness Locked
 - F. Egress After Water Contact
 - 1. Right Side Up and Floating
 - a. Canopy Seals Off - ^{RELEASE} Release Canopy
 - b. Pull ^{SCRAMBLE} Egress Handle
 - c. Pull Seat Kit Handle and Release Seat Kit Straps
 - d. Release Parachute Kochs
 - e. Stand and Inflate Life Preserver
 - 2. Upside Down and Submerged
 - a. Pull Green Apple and Secure Mask
 - b. Shut Off Canopy Seals - ^{RELEASE} Release Canopy
 - c. Pull ^{SCRAMBLE} Egress Handle
 - d. Lift Canopy and Let Cockpit Fill with Water

NOTES

Helicopter pick up for Ham-
per by the parachute
canopy. Hampered by an
inflated life raft.

Do not eject under water
unless no other way.

If loss of control and
going over side EJECT.

If on deck:

- 1. Pull ground ^{SCRAMBLE} egress handle.
- 2. Pull seat kit release handle.
- 3. ^{EJECT} Eject canopy.
- 4. Run like HELL with chute on.

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- e. Push Away Canopy and Stand Up
- f. Inflate Life Preserver
- g. *Pull seat kit handle and*
Release Seat Kit Straps and
Parachute Kochs after Surfacing

G. Ejection:

- 1. Pull Ejection "D" Ring
- 2. After Water Contact - Inflate Life Preserver
- 3. Release Seat Kit Straps and Parachute Kochs
- 4. Remove O2 Mask and Discard

IV. HIGH FLIGHT - PRIOR TO DECK CONTACT

- A. Faceplate Closed and Locked
- B. Oxygen On
- C. Canopy Seals On
- D. All Safety Pins Out
- E. Shoulder Harness Locked
- F. Egress After Water Contact
 - 1. Right Side Up and Floating
 - a. Canopy Open *JETTISON*
 - b. *SCRAMBLE*
Egress Handle Pulled
 - c. Seat Kit Release Handle Pulled
 - d. Seat Kit Handle Pulled and (Release seat kit straps) If Time Permits
 - e. Release Parachute Kochs (If time permits)
 - f. Stand Up and Inflate Life Preserver
 - 2. Upside Down and Submerged
 - a. Pull Green Apple

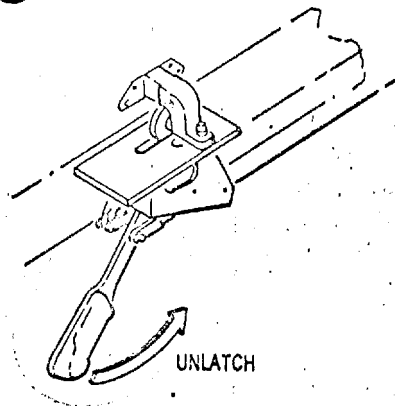
- b. Close Antisuffocation valve
- c. Canopy Seals Off
- d. Lift Canopy and Let Cockpit Fill with Water
- e. Pull ^{SCRAMBLE} Egress Handle
- f. Push Away Canopy and Stand Up
- g. Inflate Life Preserver
- h. *✓ Pull seat kit handle and*
Release Seat Kit Straps and
Parachute kochs after surfacing

G. Ejection:

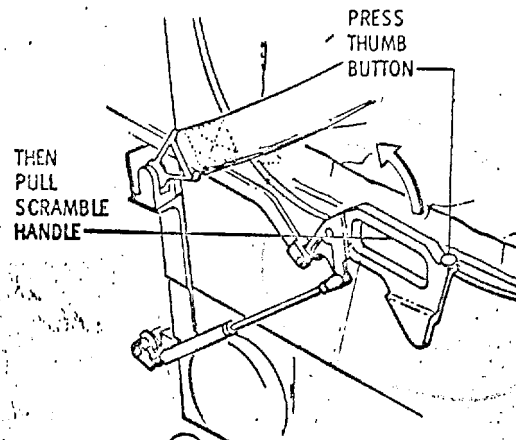
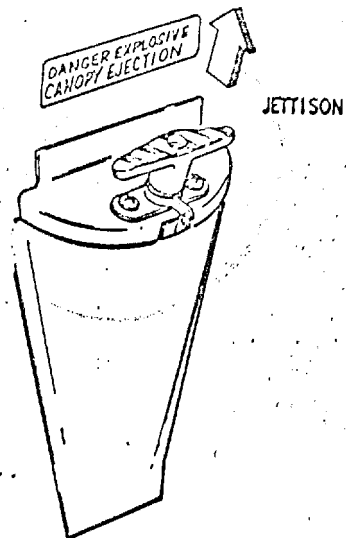
- 1. Pull Ejection "D" Ring
- 2. After Water Contact - Inflate Life Preserver
- 3. Release Seat Kit Straps and Parachute Kochs
- 4. Open Face Plate

EMERGENCY OVER THE SIDE EGRESS (On the ground)

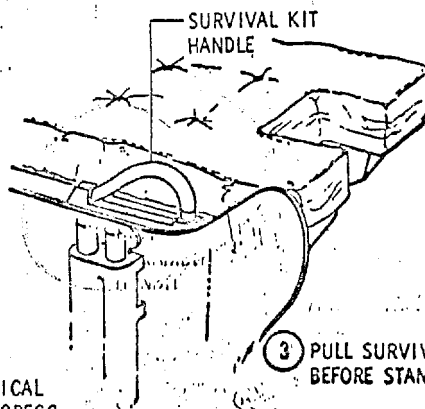
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① OPEN OR JETTISON CANOPY



② PRESS THUMB BUTTON AND PULL SCRAMBLE HANDLE

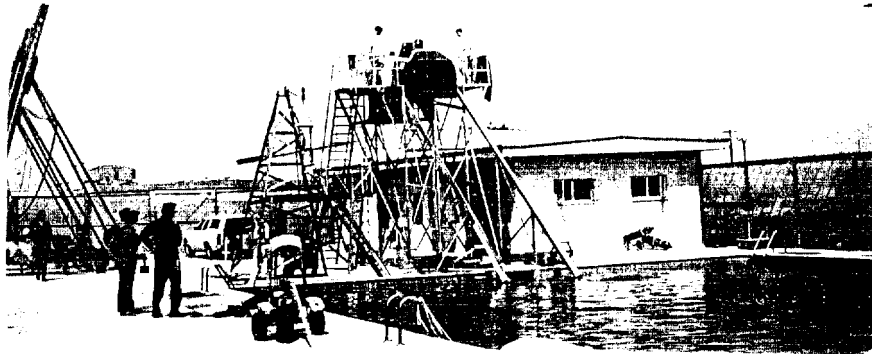


③ PULL SURVIVAL KIT HANDLE BEFORE STANDING UP

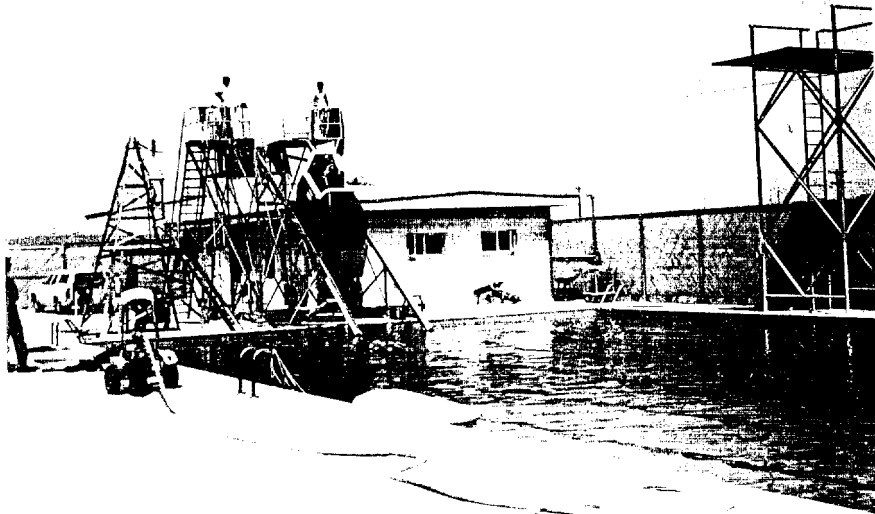
④ STAND UP TO RELEASE SUIT VENT, ELECTRICAL FITTING AND AIRCRAFT OXYGEN HOSES. EGRESS WITH PARACHUTE.

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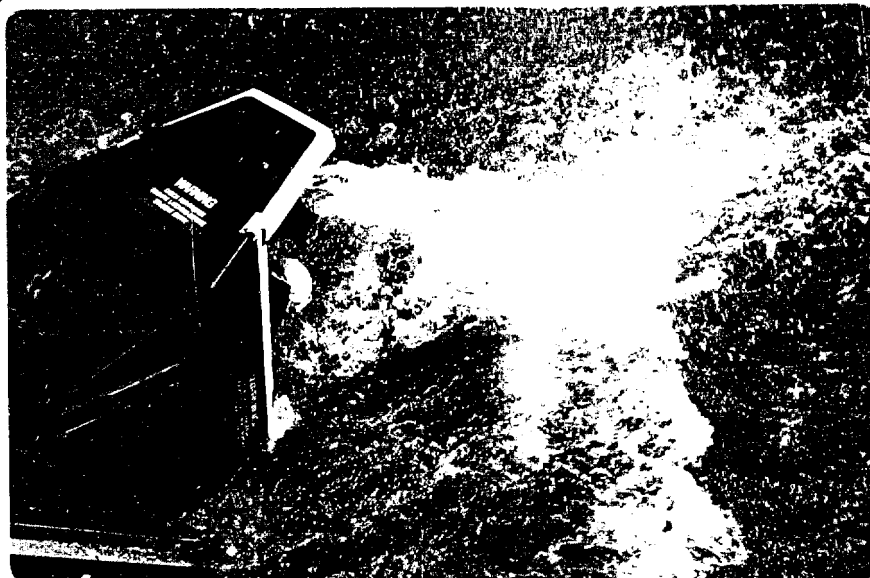
PICTURES OF TRAINER
'DILBERT DUNKER" USED
AT MIRAMAR NAS
SAN DIEGO CALIF
FOR TRAINING IDEAL
PILOTS

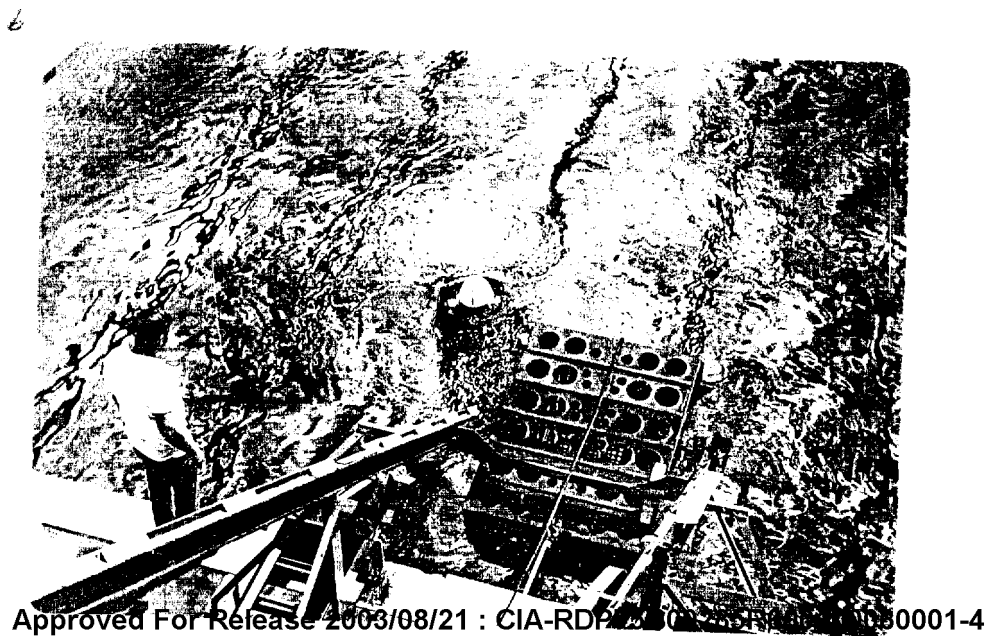
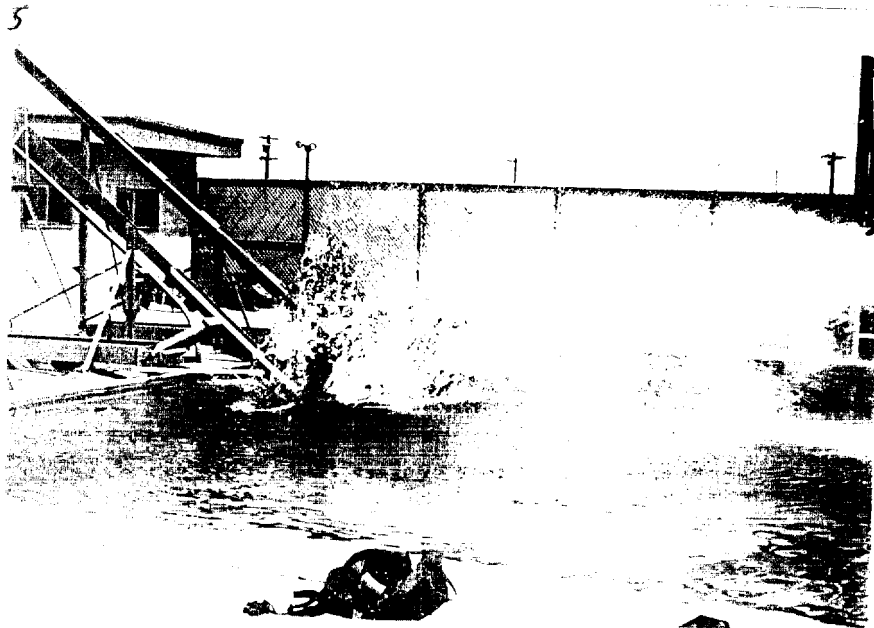
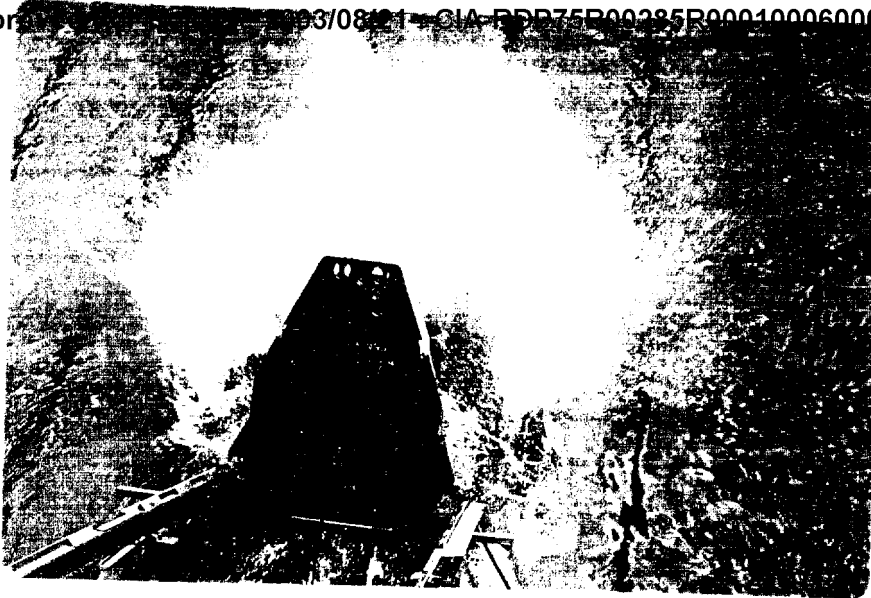


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SYNOPSIS OF TRAINING:

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1. Briefing of training device, egress procedures, and safety signals.
2. S1010 pressure suit donned.
3. Complete hookup in cockpit.
4. Rebriefing on egress procedures.
5. Dunker release and travel into water.
6. Training procedure of student:
 - a. Close helmet antisuffocation valve.
 - b. Pull emergency egress handle (seat belt manually disconnected because egress system is not armed).

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- c. Pull green handle to activate oxygen supply.
- d. Pull oxygen leads free to prevent possible cross load hangup (optional with time permitting).
- e. Check shoulder harness for disconnection (optional with time permitting).
- f. Exit cockpit by a slight roll forward and pushing downward and out.
- g. Swim to surface with parachute and seat kit undeployed.
- h. Inflate pressure suit preserver, deploy kit, and

With Seat Kit With Parachute	Without Seat Kit With Parachute
(1) Pull Green Apple (?)	(1) Blow Canopy - Close anti-suff. valve if reqd.
(2) Blow Canopy - close anti-suff. valve if required	(2) Pull Scramble Handle
(3) Pull Scramble Handle (releases parachute, foot & d-ring cables, lap belt)	(3) Pull Seat Kit Handle
(4) Stand up - releases vent, O ₂ , Intercomm leads and pulls emergency lanyard(?)	(4) Stand up
(5) Evacuate cockpit - Pull flotation - <u>Exhale to Surface</u>	(5) Evacuate Cockpit - Pull flotation - <u>Exhale to Surface</u>
(6) Get rid of seat kit (yellow handle) - Open visor	(6) Open visor upon surfacing
(7) Get rid of parachute - side straps & Koch releases	(7) Get rid of parachute
(8) Wait for pick-up	(8) Wait for pick-up
<u>Advantages:</u>	<u>Advantages:</u>
(1) Able to breathe throughout	(1) Same as ground egress - no new steps to learn
(2) One step before standing up	(2) Seat Kit weight/buoyancy no hindrance
(3) Best for deep submergence	(3) Probably best for shallow depth or just inverted.
<u>Disadvantages:</u> (1) Possible hindrance of seat kit weight, buoyancy or <u>lanyard</u>	<u>Disadvantages:</u> (1) One extra step before standing up.
<u>To Be Determined:</u> Seat kit lanyard effect - restriction possible or may eliminate requirement for Green Apple pull:	

Factors preventing vertebral pre-loading

1. Face curtain ejection actuation.
2. Non-TTC ejection.
3. NAMC restraint system—pins buttocks and shoulders back.
4. Sufficiently great ejection seat angle.

The Naval Air Systems Command has issued a military specification Mil-S-18471 A(WP) of 13 August 1965 entitled "Seat System, Ejectable, Aircraft, General Specification for." WADC TR 52-321 is utilized as the reference for sizes, but BuWeps Drawing 65 A-136H1 is utilized for ejection seat design parameters. Paragraph 3.2.1 of subject specification requires that the design of the ejection seat "shall accommodate 3 through 98 percentile aircrewmen shall be in accordance with WADC TR 52-321 or superseding documents."

Under paragraph 3.3.1.1.1.1.1, "Sufficient clearance shall be provided between the face curtain handle and the canopy to allow for hand insertion and grasping of the face curtain by the 98th per-

centile aircrewman . . . with the seat in the full-up position."

Under paragraph 3.3.6, "The seat angles and ejection envelope reference points shall be in accordance with BuWeps Drawing 65A136H1.

The net result of this new milspec for ejection seats is that the seats must be designed to accommodate the 3 through 98 percentile crewmember, that one measure of such accommodation is that the 98 percentile man must be able to insert his hand between head and canopy and grasp the face curtain with the seat in the full-up position, and that the seat angle is fixed by BuWeps drawing rather than being left to chance.

Thus, the problem of size disparity between man and aircraft is only of importance in aircraft now in inventory, provided that new purchases comply with the noted milspec.

As specifically applied to ejection seat egress aircraft of the Naval Air Training Command, the following facts are noted:

A/C Type	Seat Type	Seat Location	MSHA * (inches)	Pilot ** Percentile	'59-'63 Gross Ex Rate
TF-9J	M-B	FC	36.3	55	34%
	M-B	RC	38.0	95	36%
T-2A	Rocket	FC	38.1	90	22.2%
	Rocket	RC	38.1	90	0
F-11A	STD	—	37.5	85	12.5%
TA-4E	RAPEC	FC	ca 43	99	X
	RAPEC	RC	ca 43	99	X

* ACEL, unpublished

** U.S. Navy Anthropometry 1964

EMERGENCY UNDERWATER ESCAPE FROM AIRCRAFT

CDR C. L. Ewing MC USN, NAMI.

In naval air operations water crashes and ditchings constitute a relatively high proportion of all major aircraft accidents at sea. Experiments (i.e., with engine shutdown and simply dropped from flight deck height rather than having any greater velocity) have shown that jet aircraft float for a maximum of 60 seconds and then descend at a rate of several hundred feet per minute. Escape above water may not be possible.

Escape from a ditched aircraft may be accomplished as it sinks, after it sinks, or the pilot might be unable to escape, and have his aircraft come to rest on the bottom in relatively shallow water. Some considerable time may elapse before rescuers can obtain SCUBA gear, locate the aircraft and effect the rescue. During this period the aviator can continue to breathe 100 percent oxygen from the aircraft converter even though submerged. It must be clearly

understood that use of oxygen-breathing capabilities in the crash situation is no substitute for escape attempts, but only a means of prolonging life while escape and/or rescue can be accomplished.

Oxygen Supply Under Water

The nominal oxygen equipment installed in first-line jet aircraft, consisting of Lox converter, minireg, A-13A mask, emergency bailout oxygen bottle, will continue to supply 100 percent oxygen even while submerged. The supply pressure will be equal to that exerted by the water at the regulator. Thus the nominal oxygen system constitutes SCUBA equipment. Since the minireg is mounted at an optimal position, breathing is possible whether the aircraft is upright or inverted, nose up or nose down, or lying on its side. Since the regulator is supplying oxygen at the ambient water pressure, there is no pressure differential and no great inspiratory pressures are required.

The time duration for underwater breathing will naturally vary with the oxygen supply available at the time of the accident, the development of oxygen toxicity, the depth, and the amount of exertion of the aviator. The first two factors noted are the most important. If the accident occurred with a full converter, the 10 liter converter is capable of 109 minutes of operation at 20 liters per minute average flow at a 100 foot depth. Therefore the true limiting factor on duration of underwater breathing is the time required to develop oxygen toxicity.

Two problems may be encountered in such underwater utilization of the aircraft oxygen system while awaiting rescue. One is that buildup of ice on the warming coils may lower their thermal conductivity and result in lowering the breathing oxygen temperatures. The other is that water may freeze on exposed valve seats or bellows, thus interfering with valve operation. Since the aviator can do nothing about either problem, these factors are of academic interest only.

When the aviator escapes from the aircraft or is rescued, he can disconnect himself from the aircraft oxygen converter and continue breathing uninterruptedly and easily from the bailout bottle and minireg during ascent to the surface.

The same thing is true of underwater breathing in the full pressure suit. Since the helmet-mounted regulator is providing oxygen at the same pressure as the surrounding water, the only differential pressure across the visor would be the 1" water pressure differential normally exerted to prevent suit leakage into the breathing compartment. Specifically, breath-

ing at simulated depths of 100 feet has been accomplished without difficulty.

Moreover, the full pressure suit itself is a reservoir of oxygen, in addition to the bailout bottle and aircraft Lox converter. If neither of the latter is available, or if both become exhausted, the aviator may, as a last resort, breathe from the body compartment of the suit by "slipping" the face seal. Tests at ACEL have shown that breathing can be continued in this way in the upright position for about 10 minutes, in the side position for about 6 minutes, but only a minute or so in the inverted position. These tests were performed at a depth of only 11 feet, however.

In the single case of breathing from the suit, the major limiting factor on duration is carbon dioxide buildup with consequent hyperventilation. This is expected, of course, since rebreathing from the suit was not a design feature.

When the diluter-demand regulator is being utilized the 100 percent oxygen setting must be selected and the mask must be tightly adjusted to the face. For this reason, aviators using diluter-demand regulators should select 100 percent oxygen for all landings and takeoffs, since the system will work as well in mud or swamp as it does in seawater.

Regulator Location and Oxygen Supply Pressure

Work performed at the Navy's Aerospace Crew Equipment Laboratory has shown that one major factor in underwater breathing from aircraft oxygen supplies is the location of the regulator itself, since the pressure sensing device which determines the pressure with which the oxygen is supplied is contained therein. It was found that if the regulator were mounted six inches below the suprasternal notch, the pressure on the lungs would be excessive. If the subject with the regulator mounted at the same position became inverted, the oxygen supply pressure would be so low that water would be inhaled. These experimental findings account in part for the location of the FPS regulator on the helmet at the level of the mouth, and for the minireg on the A-13A (at about the level of the suprasternal notch). A one-foot depth separation in water will result in approximately 0.5 psi differential pressure.

The regulator's position ideally should be on the line from axilla to axilla. Console-mounted regulators, usually of the diluter-demand type, are invariably below this level, thus causing the oxygen pressure to be positive. When breathing underwater

from them, the body should be bent toward the regulator so as to have the chest and the regulator at the same level, thus minimizing differential pressure.

Physiological Problems

1. On the Bottom

Residence underwater presents several potentially hazardous problems:

- a. CO₂ intoxication
- b. N₂ intoxication
- c. O₂ intoxication

Actually, all metabolic carbon dioxide is exhausted via the exhalation valve and, therefore, carbon dioxide intoxication presents no problem. Since 100 percent oxygen is the only inspired gas, nitrogen is being washed out constantly, and, therefore, nitrogen intoxication is not a problem either. However, oxygen intoxication is very definitely a problem and the other limiting factor on underwater breathing of 100 percent oxygen from the Lox converter and minireg.

Table 1-19 from the Navy Diving Manual shows the safe durations at the noted depths while breathing 100 percent oxygen. This information gives rescuers of an aviator trapped in his aircraft in shallow water some idea of the time frame within which they must work. Emergency limits are noted in Table 1-33. When the time limits noted are exceeded, only convulsions can be expected, not death. However, death from drowning during the convulsion must be anticipated and prevented, and rescuers should realize that convulsions if they occur, are probably due to oxygen toxicity rather than injury or other cause. It should be clearly understood that the noted time limits apply only to the aviator (or anyone else) breathing 100 percent oxygen, since rescue divers probably would be breathing air. If, however, the rescuers are using 100 percent oxygen apparatus, it applies to them also.

If these time limits are exceeded, figure 1-33 presents the results of experimental exposures to pure oxygen at various depths for various times, thus allowing estimation of the probabilities of development of oxygen toxicity. The proximity of possible warning symptoms and even convulsions to the Important Operation Limit Curve is apparent. Less apparent is the contrast between the perfect conditions that existed during these exposures and the conditions that would probably exist in the field. The experiments were conducted in a pressure tank. The work rates were moderate and uniform. The

OXYGEN DEPTH-TIME LIMITS

(Depth and time limits of exposure when breathing pure oxygen during working dives.)

1. NORMAL OXYGEN LIMITS

Depth (feet)	Time (minutes)
10	240
15	150
20	110
25	75

2. LIMITS FOR EXCEPTIONAL OPERATIONS

Depth (feet)	Time (minutes)
30	45
35	25
40	10

3. EMERGENCY LIMITS

From: U. S. Navy Diving Manual NAVSHIPS 250-538 of July 1963. Chap 1. 5. 7.

inspired gas was free of carbon dioxide. Two tenders were standing by each subject. It is likely that exposure to oxygen at these depths for the same times under operating conditions following a crash would produce a much larger proportion of unfavorable effects.

To delay the onset of oxygen toxicity, the aviator should remain perfectly still during rescue operations after the rescuers are made positively sure he is alive.

2. During Ascent

The major problem during ascent is due to intrapulmonary gas expansion. If an individual ascends to the surface from 100 feet (or 4 atmospheres), the gas within his lungs will expand to four times its original volume. If not allowed to escape, it will rupture the alveoli and thus cause aeroembolism to the left heart and thence through the aorta. Such emboli can be highly variable in effects since the consequences depend upon the area or organ

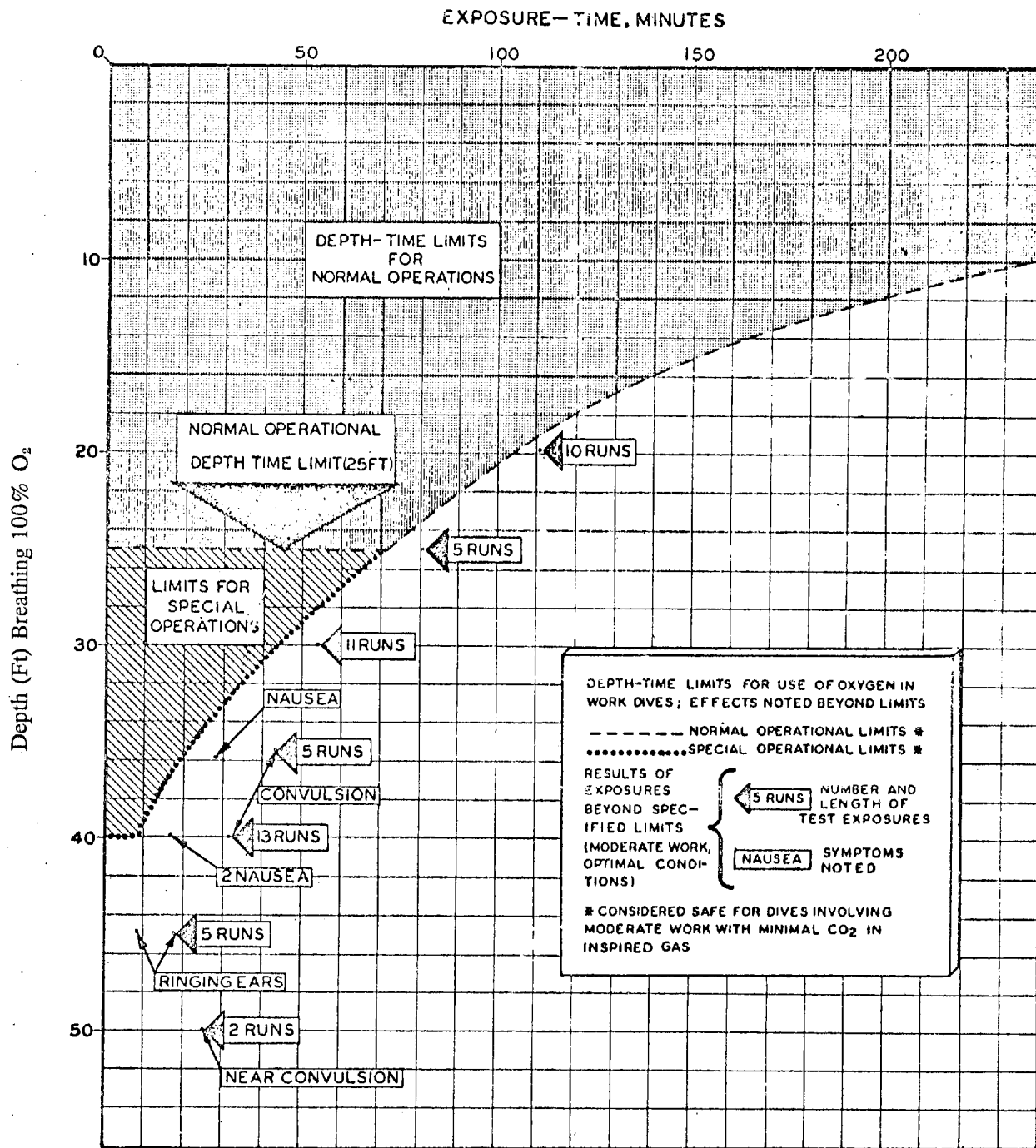


FIGURE 1-33.—Oxygen depth-time limits.

From: U. S. Navy Diving Manual NAVSHIPS 250-538 of July 1963, Chap 1. 5. 7.

where the emboli eventually block the arteries, but are frequently fatal.

Fright can, apparently, cause laryngeal spasm thus sealing the lungs during ascent. Under these circumstances, death due to aeroembolism has occurred in ascent from depths of only 15 feet. At least one such case has followed ascent from the bottom of a swimming pool, as reported in the Navy Diving Manual.

On the other hand, safe ascents can be made from depths of more than 100 feet without any breathing appliance, provided that the individual exhales continuously during his ascent. This is called the "Blow-and-Go" method of ascent and is the one to be utilized by aviators when escaping from aircraft underwater, where no bailout oxygen is available. As noted earlier, continuous respiration utilizing the bailout oxygen bottle on ascent also will equalize pressure and prevent gas expansion damage to the lungs.

Underwater Ejection

Most NATOPS procedures call for canopy jettison when a ditching or water crash is imminent. If the canopy is successfully removed prior to water impact, escape is not too complicated. However, in many instances, the canopy jettison mechanism is designed to lift the leading edge of the canopy sufficiently that normal windblast will complete the job of removal. In the slow velocity water crash, typified by the "cold" catapult shot, windblast may not be sufficient to complete the canopy removal

sequence. In other cases there is simply no time available to jettison the canopy. Also, underwater canopy jettison is usually unsatisfactory. If the canopy cannot be removed, and if through-the-canopy (TTC) ejection is possible in the particular aircraft type, it may be attempted as a "last ditch" method of escape, especially in an aircraft rapidly descending in deep water.

Water drag on the head and neck, as well as possible impact of the head on the canopy may cause severe or even fatal head and neck injury. To lessen the risk, the seat must be fired with the face curtain over the head, thus lessening the water drag on the head. The usual mechanism of injury is flexion of the head and neck resulting in cervical vertebral fracture and possible spinal cord compression.

Having pointed out the severe hazards, it can now be stated that successful underwater ejection is possible and has been accomplished with no injury on one or more occasions. ACSEB 34-61 (seal MBEU 18605) must be incorporated to assure watertight integrity of the Martin-Baker gun system, thus permitting underwater firing. Again, it must be emphasized that underwater ejection is a hazardous undertaking which should be used only if no other means of escape is possible.

The comments concerning underwater ejection may or may not apply to rocket-type seats since these have not been adequately tested. Any such use of a rocket seat should be considered extremely hazardous at least until testing has been accomplished.

AVIATION PHYSIOLOGY TRAINING BUILDING DEDICATED NAVAL AIR STATION, MIRAMAR, CALIFORNIA

Approximately 100 guests representing the U.S. Navy, U.S. Air Force, and the civilian aerospace industry attended the Dedication Ceremony and Open House of the new Aviation Physiology Training Building at the Naval Air Station, Miramar, California on 27 September 1966.

The principal speaker was VADM T. F. Connolly USN, Commander, Naval Air Force Pacific Fleet, CAPT W. W. Jones USN, Commanding Officer, "ejected" through a huge blue ribbon on an ejection seat training tower to mark the official opening of the new facility.

The new training building is a one-story concrete structure containing a rapid decompression chamber capable of simulating altitudes up to 100,000 feet, classrooms, full pressure suit fitting rooms, night vision trainers, flight simulators, administrative offices, storage spaces, and a physical examination and treatment room. Outside the building are ejection seat trainers and a water survival training tank.

With the advent of newer, high performance jet aircraft, physiological training has become increasingly important. This new facility will provide Medical Department personnel with a means of in-

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U-2R CARRIER OPERATIONS - EMERGENCY PROCEDURES

UNDERWATER COCKPIT ESCAPE

EVALUATIONS

CONCLUSIONS

RECOMMENDATIONS

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EVALUATIONS

EQUIPMENT

PROCEDURES

TRAINING

SECRET

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EQUIPMENT EVALUATION

"DILBERT DUNKER"

U-2R EJECTION SEAT

U-2R PARACHUTE

U-2R SEAT KIT

S-1010 PILOT'S PROTECTIVE ASSEMBLY

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PROCEDURAL EVALUATIONS

Escape with Seat Kit and Parachute

Escape with Parachute and without seat kit

Escape without Seat Kit or Parachute

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TRAINING EVALUATIONS

Training value in terms of:

Realism

Procedural Practice

Confidence Building

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COCKPIT ESCAPE TEST #1

To be evaluated:

1. Underwater breathing characteristics of S-1010 in inverted cockpit -- from aircraft supply.
2. Underwater transfer to seat kit breathing supply and breathing characteristics.
3. Egress with both parachute and seat kit.
4. Flotation/Buoyancy characteristics with flotation garment uninflated.
5. Seat kit and parachute removal at surface.

Results:

1. Momentary disorientation upon impact and cockpit inversion.
2. Discovered helmet filling with water.
3. Aborted planned sequence.
4. Used emergency ground egress sequence, i.e., scramble handle and seat kit handle pulled -- escape sequence with parachute and without seat kit was confirmed.
5. Buoyancy good despite helmet half filled with water.
6. Cockpit escape can be rapidly executed when necessary!

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HELMET LEAKAGE TESTS

To Be Determined:

1. Where water entered helmet.
2. Effect of position on leakage (inverted or upright).
3. Required action to prevent leakage.

Results:

1. Water entered helmet through antisuffocation valve.
2. Water entered only in inverted position due to approximately 6 inches H₂O greater pressure on helmet (and valve) than oxygen delivery pressure to oral/nasal cavity.
3. Valve temporarily sealed with tape for remaining tests. Permanent fix to be redesigned valve for manual closure in the event of inverted submergence.
4. Suit buoyancy characteristics do not change as a result of extended inverted submergence. No danger of coming to surface feet-first after cockpit escape.

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COCKPIT ESCAPE TEST #2

To Be Evaluated :

1. Same as Escape Test #1 plan, i.e., escape with both parachute and seat kit attached.

Results:

1. Breathing from ship's supply -- satisfactory.
2. Transfer to and breathing from seat kit supply -- satisfactory.
3. Cockpit escape with seat kit and parachute attached -- satisfactory.
4. Buoyancy of suit/seat kit/parachute, without flotation, -- satisfactory.
5. Inflation of flotation garment, release of seat kit and parachute -- satisfactory.
6. Flotation with garment inflated -- satisfactory.

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COCKPIT ESCAPE TEST #3

To Be Evaluated:

1. Simulated failure of scramble handle mechanism -- escape without seat kit or parachute attached.
2. Escape with flotation garment inadvertantly or accidently inflated while in cockpit.

Results:

1. Many steps involved in escape without seat kit or parachute, but can be accomplished as long as breathing supply maintained until egress from cockpit is started (i.e., either ship's supply or seat kit supply terminated as last step in egress sequence).
2. Inflated flotation garment buoyancy makes cockpit egress more difficult, but not impossible.

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CONCLUSIONS

1. S-1010 PPA/U-2R Seat Kit provide excellent protection for emergencies involving water submergence, as well as for ejection or on-deck accidents.
2. Escape from a submerged cockpit is possible even with compound malfunctions or difficulties (i.e., seat kit hang-up, ~~scramble-handle~~ malfunction, etc.).
3. "Dilbert Dunker" indoctrination using U-2R life support equipment provides a realistic environment for procedural training and confidence building.

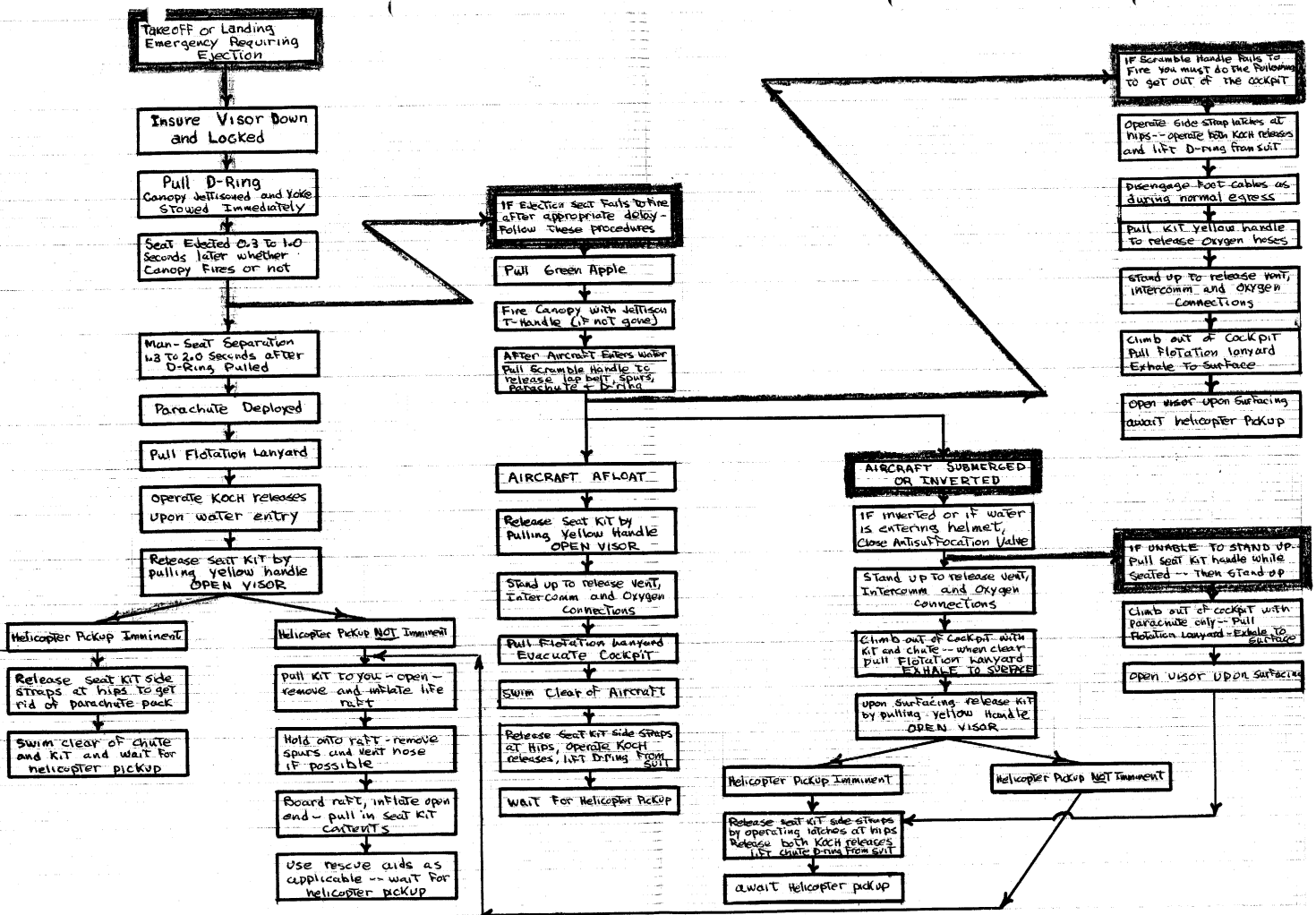
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RECOMMENDATIONS

1. S-1010 PPA be utilized on all carrier operations.
2. All carrier landings be performed with visor down and locked, and aircraft oxygen supply on.
3. An antisuffocation valve be developed that can be manually closed by the pilot in the event of inverted submergence.
4. Primary underwater escape procedure is to egress with both parachute and seat kit attached.
5. All pilots to be involved receive Dilbert Dunker indoctrination using U-2R life support equipment prior to participating in U-2R carrier operations.

SECRET



MRMPA (Maj. Lee)

SUBJECT: Special Test

1. On 18 March 1964 tests were performed to determine the capability of the MC-3A partial pressure suit to function underwater and provide surfacing capability for the wearer.
2. The test conditions were as follows:
 - a. Subject wore standard MC-3A partial pressure suit with standard oxygen fittings attached to capstan and breathing pressure leads from F-2400 regulator.
 - b. Seat kit was attached to subject and one-hundred (100) pounds of lead weights were attached to the seat kit to retain the suited subject underwater.
 - c. Subject entered the test pool in Bldg. 824 and descended to a depth of eight (8) feet.
3. The results of the test were as follows:
 - a. The subject breathed without difficulty and no water entered the helmet.
 - b. Upon release of the one-hundred (100) pounds of lead weights the subject surfaced due to the buoyancy of the suit.
 - c. Surface flotation was adequate and the subject remained in a satisfactory attitude with respect to the water surface.
4. The following recommendations are made:
 - a. In the event of a situation which places the suited crewmember under water within an aircraft cockpit, the following procedures should be followed:
 - (1) jettison canopy
 - (2) pull green apple
 - (3) release seat kit from aircraft oxygen supply
 - (4) release lap belt
 - (5) stand up and exhale continuously during ascent to surface.
 - (6) upon reaching surface inflate LPU
 - (7) Disconnect capstan and breathing pressure lines from seat kit leads and open face plate.

(8) Retrieve seat kit, remove raft and inflate raft.

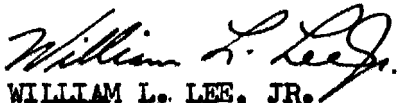
(9) Remove parachute and enter raft.

5. The following comments are considered pertinent:

a. If the canopy is not of the explosive jettison type, it must be broken and the cockpit allowed to fill with water before it can be opened and jettisoned. It is recommended that the green apple not be pulled prior to completing this procedure.

b. In the event ascent appears slow additional buoyancy can be obtained by inflating LPU below the surface.

c. The characteristics of the oxygen system are such that adequate breathing pressures can be provided for a descent to one-hundred and fifty (150) feet.

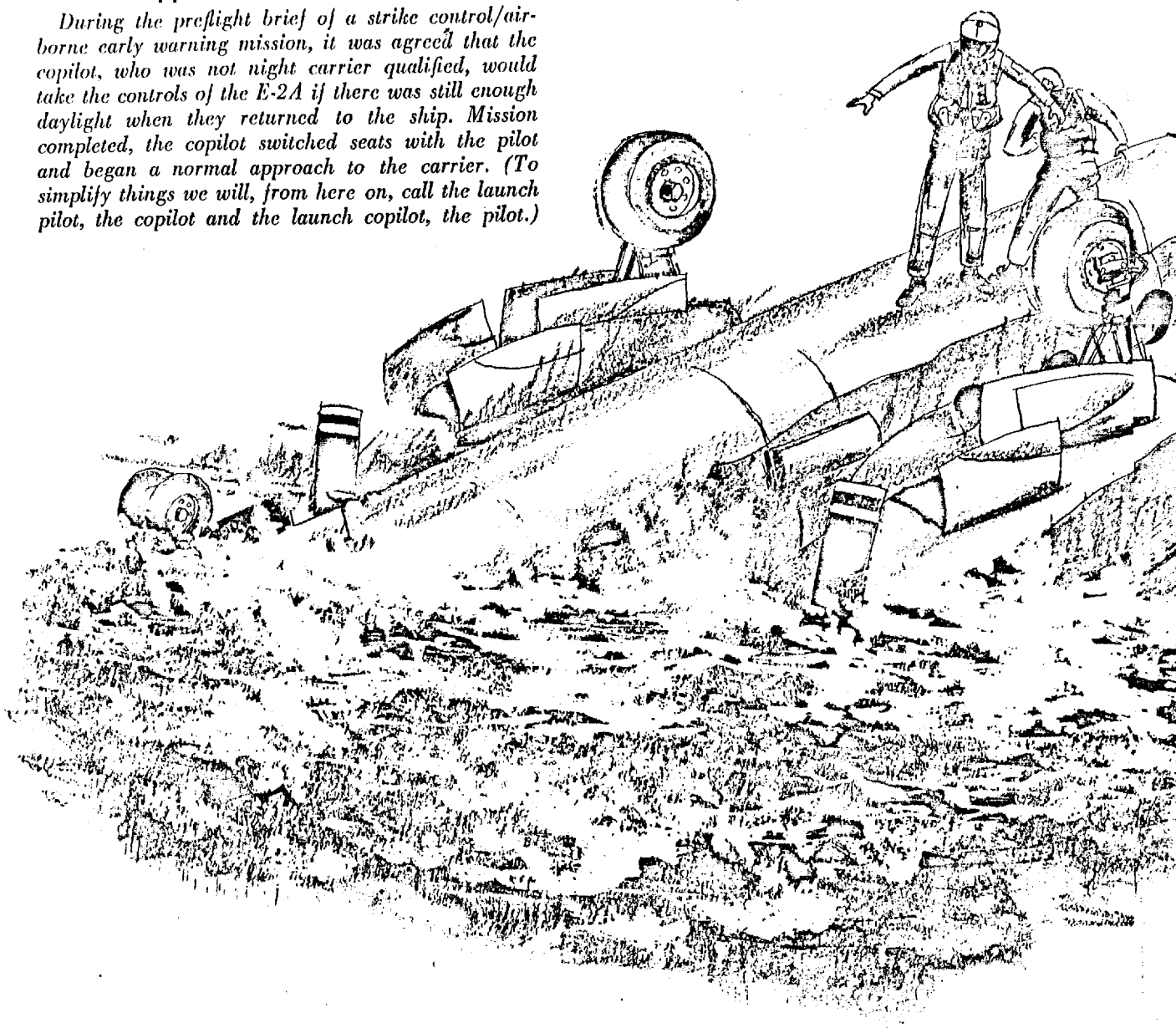


WILLIAM L. LEE, JR.

Major, USAF, MC

Chief, Altitude Protection Branch

During the preflight brief of a strike control/airborne early warning mission, it was agreed that the copilot, who was not night carrier qualified, would take the controls of the E-2A if there was still enough daylight when they returned to the ship. Mission completed, the copilot switched seats with the pilot and began a normal approach to the carrier. (To simplify things we will, from here on, call the launch pilot, the copilot and the launch copilot, the pilot.)



**'... and
the deep
blue sea.'**



At less than one-half mile from the ship, the aircraft began a pronounced right to left drift. On landing, the number 2 cross-deck pendant was engaged 28' left of center line and rollout further to the left continued. As the aircraft reached the deck edge, it rolled over the side and broke up into three pieces as it fell into the ocean. The larger section of the fuselage containing the cockpit was at a 30-degree angle to the water, nose down on its back. Less than a minute later as it sank further it began to point straight up. It was now 18 minutes after sunset.

The copilot egressed through his upper escape hatch. The combat information center operator

(CICO) and the radar operator (RO) escaped through the aft end of the fuselage in the vicinity of the third after station where the tail section had separated. The pilot and the air control operator were both lost.

Here are the post-crash experiences of the three survivors:

Copilot: The copilot does not remember hearing the aircraft breaking up or feeling any significant impact with the water. He tried to brace himself by reaching forward but he could not reach the instrument panel. As the plane went over the side, Dillbert Dunker techniques flashed through his mind. He was confident he would get out of the airplane.

Although the cockpit filled as soon as the fuselage hit the water, there was still enough light to see objects fairly well. For a few seconds the copilot "gathered his wits and looked around." It looked to him as if the pilot had released himself from the seat but he had apparently used the main equipment release handle because he had the parachute and seat pan still attached to his torso harness. This was the last time the pilot was seen.

Automatically, the copilot reached for the seat belt used in the Dillbert Dunker, a seat belt that is not present in the E-2A. Realizing this, he then methodically unplugged his mike cord and, using both hands, released his shoulder rocket jet fittings. Then he tried to release his leg fittings.

"I couldn't free the leg fittings because I was hanging in my straps," he recalls, "so I took hold of my seat with my left hand and pulled myself back into it. After doing this, I had no problem freeing them." (All of the survivors released their upper rocket jet fittings first, then the lower ones; all had trouble with the lower ones. In the copilot's instance, strapping in more tightly might have prevented this situation.)

Once free of the seat, the copilot felt around for the brace across the rear of the hatch to locate the overhead escape hatch handle. Opening the hatch, he reached out with both hands and pulled himself out of the sinking aircraft. He did not inflate his flotation gear for fear his life preserver would buoy him into the underside of the sinking wreckage and trap him. Instead, he swam out and up until he surfaced, then pulled the toggles. Just as he reached the trailing edge of a wing flap and part of the fuselage, the wreckage sank; he had to push himself away to avoid being hit. He saw the CICO and RO about 40 yards away. A helicopter was approaching. Hold-

Continued next page

approach/june 1968

ing on to a vertical face of the water, he drifted under the rescue helo. The crew lowered the sling directly in front of him; he had no trouble getting into it and was hoisted aboard immediately. On the way up he bumped his hard hat on the helicopter.

The copilot states that when he escaped from the wreckage, the plane was vertical, nose down in the water. He describes himself as a good swimmer but says that his failure to get a good breath of air before going under water caused him to "suck water all the way up." He reports that his gloves were wet and slippery but because they fit tightly they presented no real problem. During his interview with investigators he commented, "I firmly believe that if I had never been in the Dilbert Dunker I would still be in that airplane."

Radar Operator: Following the hard landing aboard ship, the radar operator had just turned to secure his radar gear. When he turned back forward, the plane was "screaming and tilting to the left." As the aircraft nosed over, one or more hydraulic lines near his seat broke, spraying him with fluid. When the plane came to rest he was inverted and covered with hydraulic fluid.

"The smell of the fluid was overpowering and all I could think of was the possibility of fire," he recalls.

He released his shoulder fittings, then tried to locate his lap fittings.

"The right fitting was so difficult to find and release that I was sure the aircraft was going to burn before I got out. The left lap fitting infuriated me. I flailed around until I found a purchase for my feet and pushed myself back into the seat. After releasing the pressure on the catch, the fitting came loose easily. My orientation was bad but I must have stood on the circuit breaker panel. I was surprised to see a large hole and water. Someone, I assume it was the CICO, was climbing out of the plane in front of me. He stepped upon a large square structure with one foot and his other foot caught in some steel cables. I reached out and freed him."

The RO stated that he knew the lap fittings would be hard to release since he had read in APPROACH an account of an instance in which this had happened; therefore he expected difficulty and did not panic.

After their escape from the wreckage, the RO and the CICO were standing side by side on the aircraft. The RO recalls he wanted to jump into the water

As the aircraft did a violent flip to nose down, both men were thrown into the water. He went under and pulled both life preserver toggles. He discarded his leather flight gloves which he said felt 10 sizes too big and made of bacon fat. Then he turned on his strobe light. The RO could not reach his pencil flares or shroud cutters because the inflated Mk-3C covered his survival vest. He was able to reach his survival knife which he carried on his right leg.

After the plane sank, the RO could not see the copilot. Because of the rotor wash, the only way the RO could observe the helo was to face away and look through his helmet visor over his shoulder. This kept the spray out of his eyes and he could tell when to turn and pick up the rescue sling.

Combat Information Center Operator: As was the case with the copilot and the RO, the CICO had felt no discernible impact with the water as the E-2A hit the sea. The aircraft broke up right behind his seat. Only sky was visible from the side windows, he recalls. Something heavy was pressing him down; he either pushed it away or it fell away.

At first, he thought the aircraft was hanging from the flight deck. His seat broke loose, facing forward and leaning on its side. He released his shoulder fittings, forgot one leg fitting but then "got it loose O.K.," and crawled aft to the large opening in the fuselage. The front end of the aircraft was "all black."

The CICO cut his left leg on a piece of flooring and his left hand on a jagged edge of the broken fuselage. He also sustained cuts on his left shoulder. As he climbed out, he noted that his flight boots with their heavy rubber cleated soles provided good traction on the oily overhead of the aircraft.

After he jumped into the water the plane started to submerge and began to pull him under.

"It was difficult to pop my CO₂ toggles in the Mk-3C because I was trying to swim away from the sinking aircraft, but the life preserver inflated and I rose to the surface. I turned on my strobe light and tried to locate my flares. The RO and I were holding on to each other. I grabbed the sling on the helo's third pass and the RO helped me into it." The CICO, too, bumped his hard hat getting into the helicopter.

On the subject of survival gear and procedures, the board's recommendation was that crews be briefed and be required to practice releasing the lower torso harness fittings first in a ditching situation. ◀

AIRCRAF
OPNAV FO

SECTION B. CONTRIBUTING FACTORS

Are you and your personal equipment ready for an emergency?

approach/june 1968

EJECTION NARRATIVE

1. During the process of landing, the aircraft veered off the right side of the runway and overturned in a ditch containing three to four feet of water. Both occupants were pinned in the cockpit. The aerial photographer was knocked unconscious and drowned; however, the pilot managed to survive this situation for forty-five minutes before being rescued.

2. The following is an extraction from the pilot's own statement:

"When the aircraft stopped, I was in darkness except for the warning lights, and water began to spray into the cockpit.

I turned off the battery switch and by this time the entire cockpit was filled with water. At first I became very panicky. Then when my oxygen mask began to fill with water I stopped. I held my breath and reached for the "Green Apple" on the emergency oxygen bottle and pulled it. The rush of oxygen pressure cleared all the water out of my mask and I could breathe again. I reached down to check that the oxygen regulator was in 100%. It felt like it was and I felt it was, as I was getting oxygen free of water. I was still a little panicky and I was breathing deeply and rapidly. I slowed my breathing rate to prevent hyperventilation. I rested for a while and tried to decide on my next move. I decided to release the canopy lock and pulled canopy release under the right canopy rail. The canopy seemed to move a few inches. I also released my lap belt so I could get out if the canopy was pulled away. I came out of the seat only slightly.

After blowing the water out of my mask with the emergency oxygen bottle, I had to press my mask against my face with my left hand. The mask appeared to leak most around my nose so I pressed close and I breathed through my mouth entirely. If I tried to move around in the cockpit, the mask would start to leak. When it did begin to fill with water, I would blow hard and the water would go out. From then on I stayed relatively still. Even though I was pressing the mask hard some water still came in, and I was about half oxygen and half water. By breathing through my mouth, I could

swallow the water and breath the oxygen.

After I calmed down, I kicked my heels against the cockpit floor. I hoped this would tell the rescue people I was still alive. I could also hear thumps on the airplane as if someone was hitting it.

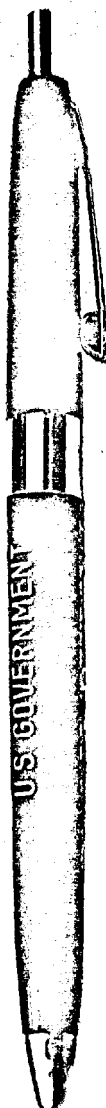
I then felt something pulling on the left sleeve of my flight suit. I reached over with my right hand and felt someone's hand. I squeezed the hand. We proceeded with the hand squeezing until the aircraft moved as if being pulled. Then the hand would come back and I squeezed it again. This happened twice. The third time the aircraft moved, it appeared to be moving steadily. The canopy seemed to be pulled away and as the aircraft moved, I could see light which told me I was near the surface. About that time I popped to the surface over the left canopy rail. As I could just keep my face above water, I continued to hold the oxygen mask to my face. I could hear the rescue people.

They grabbed me and started pulling me out of the water. They released my parachute and survival kit and carried me to a stretcher, then placed me in the ambulance. Since the firemen were spraying foam on the aircraft when I surfaced some of it got in my eyes and they began to burn. I asked for some water for my eyes. None was readily available, so I told the doctor to get my drinking water bottle out of my right G-Suit pocket. He got it and washed out my eyes, which stopped the burning. From there I was taken to the dispensary."

3. The pilot survived his ordeal because he had the presence of mind and the control of emotions not to panic, but to use his personal equipment under circumstances rarely encountered. It is, therefore, recommended that the physiological training includes not only the use of the equipment under normal conditions, but the use of the equipment under abnormal circumstances as well. Further, better fitting of the equipment is desired. Extensive briefing, especially for the back seat riders, on knowledge and use of this personal equipment with the stress on the means of escape. There should also be insistence on good flying discipline, which seems to have lacked in this case.

4. The pilot's cool, purposeful, levelheaded behavior while inverted and submerged under water with fuselage burning above him, certainly is to his credit. He is a professional not only when it comes to flying, but also when considering other factors requiring professional judgment and behavior, especially under life threatening situation he was faced with. He did not panic but purposefully kept his emotions under control and applied his knowledge and training in the use of all his available equipment. He is alive today only because he is a professional pilot in the full meaning of the word.

THE PEN IS MIGHTIER



ON A recent cross-country flight from a naval air station to an Air Force base in an A-6A, the squadron flight surgeon acted as crewman and lineman. As anticipated, AFB personnel were not checked out in this Navy aircraft and it was necessary for the crewman to install the five ground lock safety pins when the plane was in the chocks. As the aircraft entered the chocks, the pilot opened the canopy. The flight surgeon disconnected the anti-G suit, lap belt, leg belts, oxygen mask, radio connection and ejection seat connections. After detachment from the cockpit, he still had on an orange flight suit, helmet, survival vest, torso harness and anti-G suit. As he climbed out of the cockpit, placing his right foot in the aircraft ladder, he shifted his weight to the right foot. This action caused his left shoulder to move in a right forward and downward direction. A U.S.

Government-issue ballpoint pen slipped gracefully from the pencil pocket located on the left upper arm. The pen fell 12" forward of the starboard jet intake and was immediately sucked into the engine, digested and excreted. Inspection of the starboard jet engine revealed minimal damage not requiring repair.

Seldom is the flight surgeon the source of FOD. We have all noted the warnings around squadron areas and air stations. Even more alarming is the fact that the pen, flight suit and procedure were regulation. The operations officer (pilot of the aircraft) recommends the starboard engine be shut down before the right seat crewman leaves the cockpit (except for ejections). The flight surgeon recommends that pencils and pens be carried in zippered pockets while flying similar aircraft.

*LTR. C. Small, MC
VA-52*

E-2A DITCHING

WHEN THE No. 4 cross-deck pendant broke after an E-2A had caught it, the aircraft continued off the angle deck. Both instructor pilot and student pilot braced themselves for the impact.

The aircraft entered the water in level flight at 40 kts. Both men released their torso harness fittings. Having time, the instructor put his seat back, removed his PK-2 life raft and placed it on his lap.

The student was unable to open his hatch. Every time he pulled the

lever the pressure leaked out in short hisses. The instructor motioned for the student to wait until the aircraft was clear of the ship before egress as they appeared to be floating well and water had not entered the cockpit although it was at eye level on the side window. The instructor tried his hatch and since it worked, resecured it until the ship went by. He did not want to increase water entry by reducing the cabin pressure.

Once the ship was past, the

**notes
from
your flight surgeon**

approach/november 1968

hatches were opened easily. The instructor stood up, tossed his life raft out, then egressed. The student was unable to remove his raft although he went back down for it after exiting partially. At the instructor's urging he abandoned his attempts and climbed out through the hatch. They inflated their Mk-3Cs and then jumped off the nose of the aircraft into the water. The instructor inflated his raft and entered it.

Almost immediately the helicopter was overhead. The student entered the sling and was hoisted. The instructor got clear of his raft and was also picked up by means of the sling. It was later determined that the time between impact and arrival back on the carrier deck was 3 1/2 to 4 minutes.

"The survival training which these pilots had undergone in the Dilbert Dunker, deep water survival, and ditching drills was a strong factor in the logical, orderly way they reacted to their accident," the investigating flight surgeon reported. "The confidence gained from practicing and thinking through emergency procedures is evident. The instructor is to be commended for his guidance of his student in this emergency. A student's performance in a stressful situation often is greatly affected by the confidence he has in his instructor and the confidence his instructor has helped him develop in himself.

"More room in the cockpit for maneuvering and for removal of the PK-2 raft from the seat is afforded by first sliding the seat aft," the flight surgeon continues. "Sliding the seat aft is also essential in E-2A bailout procedure in order to release the back pack from the seat and this should be emphasized in ditching drills as well."

The instructor pilot praised the work of personnel involved in the rescue: "We both felt that the helo

crew and ship's company involved were extremely proficient in maneuvering and in the recovery and we express our sincere thanks and those of our families and friends."

BASIC RULE

A BASIC rule of combat flying is to keep your hardhat visor down. Getting part of the canopy in your face or eyes after a 37mm hit will prevent you from returning with what otherwise might be completely flyable aircraft.

*LCDR Jim Quinn, VA-94
A-4 Crossfeed*

TIGHT CHINSTRAP

THE HARDHAT worn by a UH-1E copilot lifted several inches off his head on impact. If his chinstrap had not been tight, the helmet most certainly would have flown off, the investigating flight surgeon reports. The helmet probably prevented head injury during egress; yellow paint from the door frame was found on the helmet after the accident.

SLIT SLEEVES

A FIRE retardant flight suit cannot offer you maximum protection if you modify it.

A pilot in a helicopter accident had slit the sleeves of his nomex flight suit so that he could roll them up. When the helicopter crashed and burned after engine malfunction, he sustained second degree burns on both forearms. (In the same accident the copilot's failure to wear flight gloves resulted in his receiving second degree burns on his left thumb.)

Investigators state that the nomex flight suits worn by both pilot and copilot minimized the severity and extent of the burns received.

"The nomex flight suit is a valuable item of flight clothing," the investigating flight surgeon reported. "Both men feel that for the amount of fire in the cockpit they received minimal burns. I agree."

VALUE OF SIGNAL FLARE

"WE DID not immediately spot the survivor," a SAR helicopter rescue copilot stated, "but as we began searching, the A-3 overhead reported a smoke flare aft of our position. As we turned, I spotted the last trace of smoke from the flare and headed the helicopter for it. As we reached the area of the smoke, the first crewman spotted the survivor on our port side."

"The value of signal flares is again confirmed in this accident," an endorser wrote. "Since repeated rescues have been effected through their use, all pilots and crewmen must be completely checked out in their use and be fully apprised of their value."

COLDS AND FLU

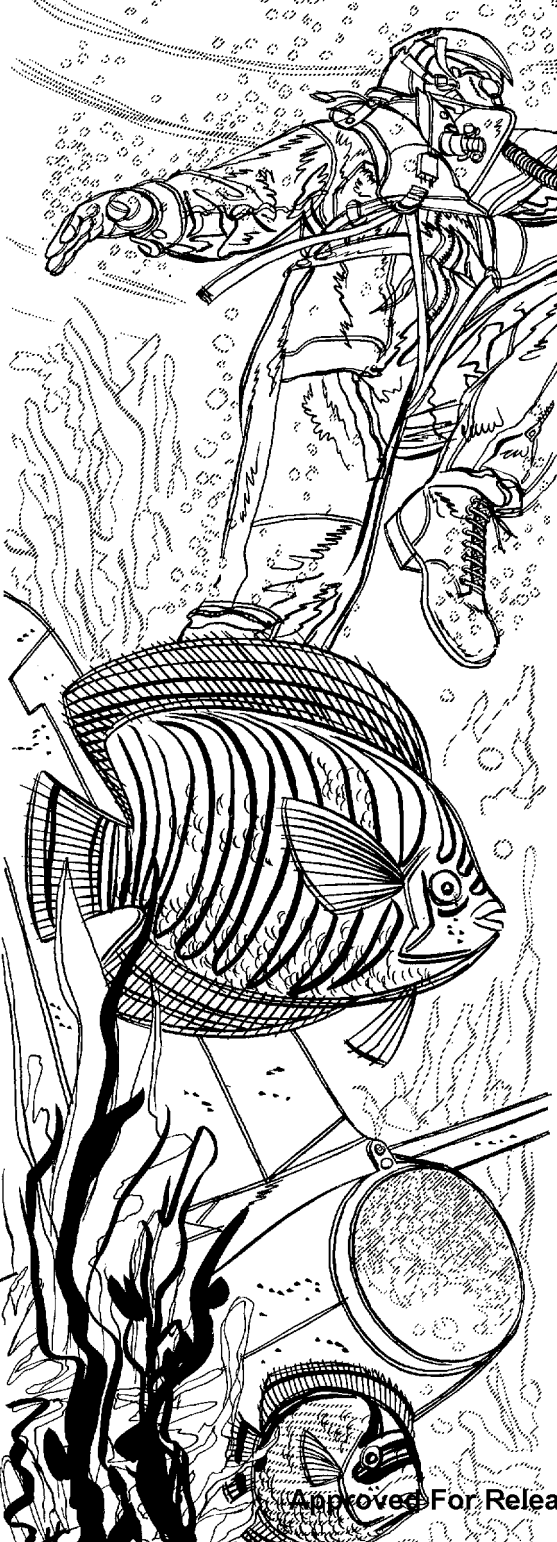
HERE'S an item picked up last winter from an aviation safety council's minutes. It's as pertinent now as it was last January.

"Our cold and influenza rate has been extremely high since we left port and we have had a large number of pilots down. Many who had severe colds did not bring this to the attention of the flight surgeon until they had complications. Then it was discovered that many had been using self medication. These cold medications characteristically cause drowsiness and a decrease in reflex time. These effects may not be noticeable on the deck but at 5000 ft they may become critical."

LTN. W. Lawson, MC

100% below H₂O

Maj. M. A. Wiener, Eglin AFB.



IT WAS one of those perfect days for flying. Blue sky, warm but not hot, about a 12-knot wind, and an interesting mission to fly. The pilot assigned to the flight went about the routine of filling out the clearance and getting his weather briefing with zest; this business of flying jet fighters was really living. He checked his equipment before going out for the preflight — maps, computer, helmet, gloves—everything okay. Wait a minute, need a Mae West at this base, takeoff is over water and part of the mission is an over-the-water flight. All set now, let's get cracking, want to be airborne at the scheduled time.

Out to the plane, walk-around check with the crew chief, look at the Form One and climb in. Get settled in the seat, oxygen mask fitted and tight, cockpit check made, start up, recheck everything and away we go.

At the end of the strip the pilot made his runup, called the tower and taxied into position. As he came in with the throttle and started to roll, he could see the blue waters of the ocean at the end of the runway. He broke ground, pulled his gear and started a climb-out.

Suddenly it happened. Right off the end of the runway. The engine surged once, twice, and then no more thrust. A nice spot to be in — no altitude, not much airspeed and only a few fleeting seconds to try emergency procedures. Nothing to do but ditch straight

ahead — can't seem to get the canopy off — have to try manually after setting her down. Quick call to the tower stating that this is an emergency, that he is ditching off the end of the runway.

The man in the tower alerted the crash circuit and watched as the aircraft settled into the water amid a screen of spray. The plane floated, low in the water, but the pilot couldn't seem to get out. Gradually it sank beneath the surface. A minute passed that seemed to stretch into hours; another; two, five — a helicopter hovered over the roiled water but it was too late now, or was it? Almost 10 minutes after the plane disappeared, sudden activity could be seen in the water. The helicopter lowered the sling and pulled up a dripping object. Couldn't be the pilot — no man could stay under water for over nine minutes and live, or could he?

Fifteen minutes after the emergency occurred the pilot was standing in base operations, dripping, bedraggled but unhurt. He had spent a good portion of that time underwater but he got out with only a ducking. The question might well be asked, "Does the Air Force have some new Jules Verne-type equipment that enables a man to breathe under water?"

The answer is no! The hero of our hypothetical case (but it could have happened) only had to do two things in order to keep breathing under water for over nine minutes, or considerably longer if necessary.

He had to have his oxygen regulator set on 100 per cent and he had to have a good, tight fit of his oxygen mask. Nothing else. No special equipment, no newly designed breathing apparatus, just a standard issue Air Force A-13A or A-14 oxygen mask and the knowledge of how to use it if an occasion arises.

The possibility of emergency underwater breathing, using the standard oxygen equipment installed in U. S. Air Force aircraft, was first brought to the attention of the Air Force through a research report by L/Commander Arthur L. Hall, USN, assigned to the U. S. Naval School of Aviation Medicine. His report was published in July 1952. It pointed out the fact that it was possible for an aircrew member to breathe under water by using the aircraft oxygen equipment after sinking with his aircraft following a ditching.

Hall's report summarized a series of experiments he made using stand-

FLYING SAFETY

empty when the fuel totalizer had dropped to approximately 350.

I check the leading edge and wing tank fuel pumps prior to takeoff, however, by pumping approximately five gallons with each set of pumps into the fuselage tank. Now I know that the totalizer should hit close to 340 when the tips go dry. If the totalizer and the tiptank light don't check with each other, I'm immediately suspicious. I make the same check when the wing and the leading edge tanks register empty.

It's always possible for one of the fuel boost pumps to go out and the malfunction will not become known until the pertinent fuel warning light comes on over the leading edge or wing tank switches. When this happens, subtract the total amount you normally would have when the light comes on from the amount now registered on the totalizer. This will be the amount no longer available.

For example, you know that when the main wing tank fuel is exhausted, the totalizer should read approximately 195. If the wing tank warning light comes on when the totalizer reads 250, you had better plan to land earlier than you anticipated, because you are now 55 gallons short.

Now on to a couple of little items which cause accidents, but definitely. First, there's a slight headache known as the oil filler cap check. The oil cap check has presented such a problem that a Flight Safety supplement T.O. (IT-33A-1W) has been printed to insure that pilots are aware of the importance of the filler cap security. The oil cap check has been a part of the visual inspection requirements in the T-33 dash one handbook for a long time, but we still have instances of pilots groping for the runway with a cockpit full of dense blue oil smoke.

If you have long arms, you probably have no real difficulty in reaching down through the plenum chamber to check security of the oil cap during the visual inspection before takeoff. If you have short arms, you might belong to the fraternity of pilots who can barely touch the oil cap, much less check it for security. If you are short-armed, you are one of the guys most likely to have an accident because you didn't check it. Don't get lulled into a false sense of security. Do whatever it takes to insure that the cap is secured. Remember that it is possible for the yellow aligning lines on the oil filler neck and oil cap to be aligned when the cap is actually

unfastened. The only positive check is to grab the cap and see if it comes off. If you can barely manage to touch the cap, don't jiggle it around with your fingers; you'll run the danger of unlocking it. If necessary, have your crew chief open up the right upper or lower engine access door so that you can make a positive check of the cap. Stay at that spot until the airlock fasteners are again hooked up and recheck them for security.

The latest information from Wright Air Development Center indicates that a curved extension is being devised for the oil filler neck and will be forthcoming in the near future. In the meantime, be smart. REACH FOR THAT OIL CAP!

In addition to the check of the oil cap, you can further increase your assurance against smoke in the cockpit by properly closing off the "foot warmer" and "head warmer" vents in the rear cockpit during the visual inspection prior to engine start. If you're the student pilot and the guy in the back seat is the IP, disregard the vents. He'll close them if smoke enters the cockpit. But if you are going solo or the guy in the back is other than an experienced T-33 pilot, be sure to shut off the vents in the rear cockpit. If smoke comes pouring in, all you have to do is close your own front cockpit vents and dump the cabin pressure and you have no sweat. Incidentally, I recommend that the head warmer vents in both front and rear cockpits be closed during takeoff. It's not easy to fly the airplane with your left hand while kicking at the foot vent levers and the cabin pressure dump valve, then reach behind you with your right hand for the not-easily-accessible head vent lever.

Before you take off, run the engine up to 100 per cent rpm and make your routine check of engine instruments and insure that tiptanks are feeding. During this time, look down at the foot warmer vents and check for smoke. If you're on 100 per cent oxygen, as you should be, you probably wouldn't smell any smoke that might be entering the cockpit.

Another essential item in the T-Bird is a good flashlight! It might be a great temptation to slip a pencil type flashlight in your flying suit or jacket sleeve at night, but don't do it unless you back it up with a reliable GI flashlight or its equivalent. Your pencil light will serve you in the cockpit, but it won't help you when you're wondering about the position of the

aileron trim tab on a dark night. A good strong flashlight will be worth its weight in gold if you should ever experience uneven tiptank feeding under these conditions.

In conclusion, a couple of other tips might bear mentioning. One of these concerns the delicate subject of ballast in the nose of the bird. If your aircraft has an APX-6 radio set and gun ammunition cans installed in the nose, you won't be concerned with any ballast problems.

However, if your T-33A is used primarily as an administrative aircraft or for other duties not involving some phase of gunnery, it is possible that the ammunition cans and the APX-6 may be removed. In this event you may be the unlucky one to attempt takeoff with excessive personal baggage crammed into the nose section. With the ammunition cans and APX-6 removed, the T-Bird can hold two nearly-full B-4 bags plus several other bulky items. With this extra ballast the nose gear has a decided tendency to remain glued to the runway during takeoff. If it is absolutely necessary to make a flight with this much baggage in the nose section, it is recommended highly that you weigh the baggage and delete a corresponding amount of lead ballast.

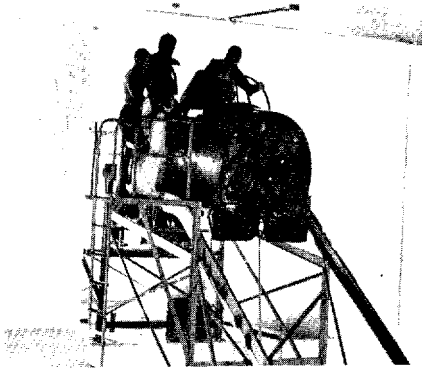
The last tip is for those pilots who might have occasion to sit in the front cockpit of the T-33A and observe while someone is under the hood in the rear cockpit. There have been a couple of accidents because neither pilot noticed uneven feeding of the tiptanks. The pilot in the rear cockpit can't always detect whether he is using excessive aileron trim while he is under the hood. If you are in the front cockpit, keep glancing to the left and maintain a close watch on the aileron trim tab. If you detect an unusual amount of trim, take control of the aircraft for a minute and make a check to see if you're having tiptank trouble or plain pilot technique trouble. If you don't, you may be in for a terrific thrill when you ask the other pilot to demonstrate a steep turn while under the hood.

We all know that the old T-Bird is a good, reliable piece of flying machinery. But, even as you and I, sometimes it can get a little out of whack and not function properly. Most of you may never have to use these tips but remember, most of them were learned the hard way, and this experience passed on to you is like money in the bank. ●

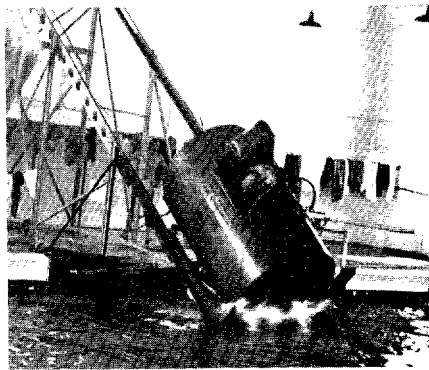
we'll raise you. However, if you are given the chance actually to try out the system, you'll be a believer too, and that's why we're stressing the necessity for training.

The third must on this list is that of setting the oxygen regulator on 100 per cent. You've got to do it, even if time is short. If you'll stop and think for a moment you'll remember that with the regulator on DEMAND you're getting a percentage of oxygen and air, mixed properly for the

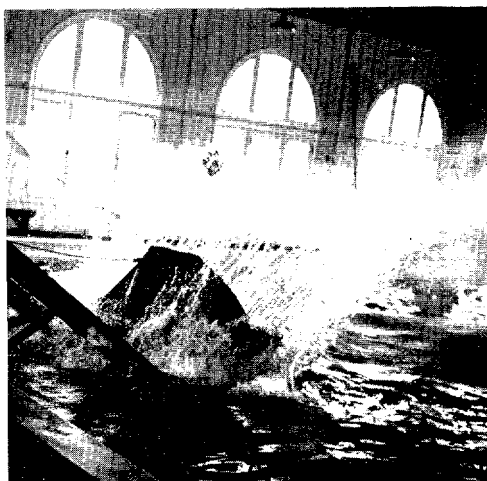
The Navy "Dilbert Dunker" is a mocked-up cockpit used to simulate ditching conditions.



Fully clothed, wearing a chute and Mae West, students hit water at approximately 27 knots.



Upon contact, the "Dunker" flips over and sinks. Students free themselves and swim out.



existing altitude. That's great while airborne but not worth a tinker's you-know-what when you suddenly subject the mixing valve to H₂O. Get it? Okay, remember, *the regulator must be set on 100 per cent oxygen.*

The last factor involves the bailout bottle. Most of you automatically will think of that little beauty as a first-aid helper in case of an unexpected dunking.

The only advice we can give you on that score is *don't use it.* The reason is very simple. It won't work. The bailout bottle cannot be used under water, because normal breathing will reduce the pressure in the breathing tube enough to allow water to enter the one-way valve at the end of the oxygen hose.

A series of controlled tests were conducted both in a pool and in the Gulf of Mexico. Admittedly, the AFOTC people didn't deliberately fly a few first-line fighters into the drink in the interest of science, but it was possible to simulate actual ditching conditions in some mighty wet water, and a lot of lessons were learned.

Almost all of the volunteers suffered mild attacks of claustrophobia at first. It's a perfectly natural reaction, and all of us are subject to the same feelings when faced with the realization that we're suddenly going to be removed from our natural environment and placed in a position where all light, air and personal contact is something no longer available. Although this isn't strictly true, the feeling is there. It's a case of the unknown, and that's our worst enemy.

To the man who ditches, the shock of entering the water is sometimes a bit severe. However, he now has the most important factor in his favor. He can still breathe. Maybe the impact and the cold will take his breath away momentarily. Probably it will. But, as soon as he starts to function normally again, he won't be faced with the horrible necessity of holding his breath (if there's any left to hold), and that spells the difference between a successful evacuation of the aircraft and failure.

It should be noted that both test volunteers and pilots who have ditched report that it is somewhat difficult to breathe as the aircraft (or test seat) descends lower and lower. This, however, is natural, and there's no reported case of anyone giving up the attempt even though it was a trifle difficult.

It has also been found that the

deeper one descends, the more rapid the breathing will become. But, with the diluter on 100 per cent and things pretty much in your favor, go ahead and puff.

Most of us have done quite a bit of swimming and diving at one time or another. Probably in the old mud hole when young and in the average pool a bit later in life. The point is that normally you've had pretty good vision while under water. Don't let this fool you. If you ever dunk a plane in deep water, you're going to be blind as the proverbial bat after sinking for about 10 feet. Consequently, you'll have to go through all of the releasing motions by feel. This may sound silly too, but remember, you must disconnect the hose last.

The Air Force Operational Test Center would like to see a very comprehensive underwater training program aimed at those who might be saved by knowing how to use their oxygen equipment underwater. The recommendation is that a unit be employed similar to the famous "Dilbert-Dunker" currently used by the Navy. There's a good reason for this feeling too. Dilbert really simulates many of the factors encountered during an actual, unexpected dunking. The shock is there, snapping the driver against the belt. As the simulator hits the water, it flips over and starts to sink in an inverted position. And, it's right then that the pilot has to get busy, unstrap himself, kick free and then swim to the surface.

Such training establishes two very important impressions. Personnel learn that they can ditch if necessary and ride the plane down while they get themselves free of the aircraft and at the same time, they can continue to receive life-giving oxygen from the system. Once such a demonstration has been experienced, it will never be forgotten. Knowledge then takes the place of blind, unreasoning panic, and a successful evacuation of the plane can be an assured fact.

Interestingly enough, all flight personnel at Eglin AFB are currently being indoctrinated in this new survival program by a series of lectures included in the physiological training program, and in the near future will participate in simulated ditchings.

The best thing about this entire test program or programs as established by the USAF and the Navy is that the findings are not based on experimental data alone. This is one time when skeptics can't say, "Sure,

FLYING SAFETY

ard oxygen equipment attached to an airplane seat. The experimental unit and subject were dunked in Pensacola Bay over the side of a boat. All possible attitudes in relation to the water surface in which a crewmember might find himself were used by attaching lines to the bottom of the seat. The depth of the oxygen regulator in relation to the man's body was also varied, while each of eight subjects was submerged to a depth of 33 feet in one series of tests and to 65 feet in another.

Hall found that varying the position of the regulator affected a man's ability to inhale and exhale. When the regulator was above the base of the neck, negative pressure was built up inside the mask and made it more difficult to inhale. When the regulator was lowered to a position below the base of the neck the subject had some trouble exhaling because of the built-up positive pressure. The best regulator position was found to be as near the base of the neck as possible.

The Naval School of Aviation Medicine stated that the results of these experiments showed, "That if a pilot keeps his oxygen mask on and connected to his aircraft oxygen supply, with his regulator on DILUTER OFF (100 per cent) when a water landing is imminent, his oxygen equipment should protect him for an extended period of time if normal escape from the airplane is impossible for mechanical reasons, physical injury or if he loses consciousness on impact."

As so often happens, sister services have much the same operational problems in many theaters. The Air Force and the Navy both carry out extensive overwater missions, and the possibility of an unexpected dunking is an ever-present possibility in the operations of both.

Consequently, the Air Force decided that a series of experiments paralleling those of the Navy were warranted in order to test AF equipment and to determine the feasibility of its use under similar conditions. Headquarters USAF directed that the Air Force Operational Test Center (APGC), Eglin AFB, assume the responsibility for an exhaustive study and analysis of the possibilities of underwater survival.

Careful evaluation of findings and incorporation of them into sound recommendations that could be disseminated to all Air Force agencies concerned were also directed.

Flying Safety Magazine was alerted

and asked to be the medium for spreading the word, and at Eglin and the Pensacola Naval Air Station, the editors had an opportunity to learn first hand just how well this newly discovered system of self-rescue works.

The one primary requirement for self-preservation following an emergency ditching is clearly spelled out in the AFOTC recommendation that followed evaluation of the test program. It could well be covered in a single word. *Training!* Possibly that sounds like a disagreeable word to many of you. Just remember though, a few minutes of the proper training may keep you in business long enough to collect that retirement check one of these fine days.

The Air Force Operational Test Center has this to say about the feasibility of underwater breathing: "Use of standard installed equipment will work beyond any manner of doubt. We recommend, however, that an indoctrination program be initiated in the use of this standard oxygen equipment for emergency breathing underwater for all rated personnel and aircrew members. First hand knowledge is superior to theoretical discussions, and in knowledge lies ability."

In commenting on the test program, Colonel Walter B. Putnam, Commander, Air Force Operational

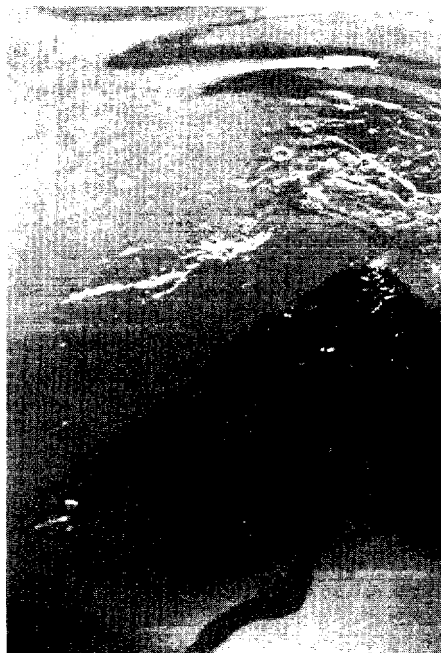
Test Center, said, "These tests and their results have shown that the Air Force has a new capability for a piece of presently installed equipment at no additional expense and with no additional weight penalty. It requires only the knowledge of how to use it, which, in turn, involves training of aircrews in this emergency underwater breathing technique.

"There is no question that in many instances this new technique can and will save the lives of Air Force personnel during ditching emergencies, if properly employed."

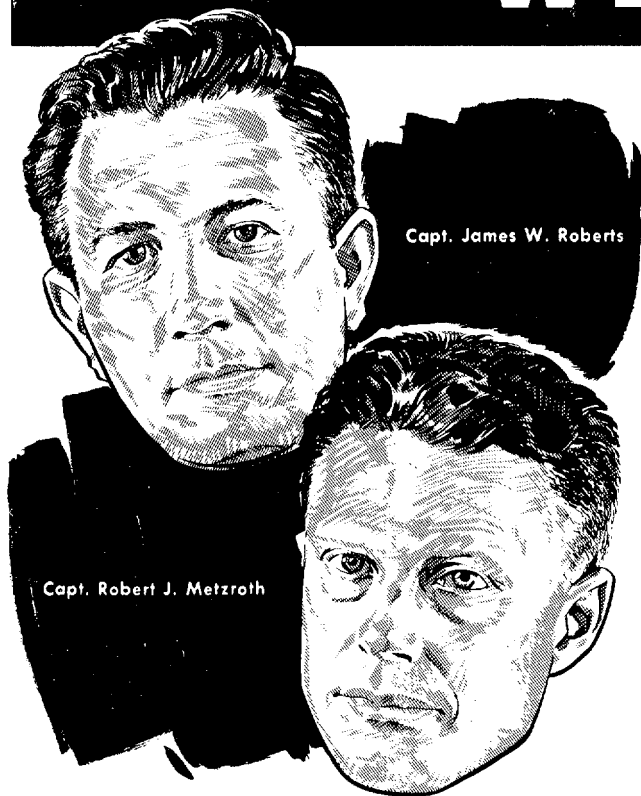
Basically, there are four factors that must be considered and understood when using installed oxygen equipment for underwater breathing. First and foremost, it is mandatory that the oxygen mask be fitted properly. If you're spending a goodly part of your time tooling around the blue at high altitude, it's a cinch that your mask will fit properly. If it fits upstairs it will do the job under water.

The next factor may be a bit on the psychological side and is a lot easier to recommend than actually do, but, if you're ever faced with an actual ditching and you've got to ride the old blow-torch down for a few feet under the drink, then it's a *must* that you remain calm. Easy to say? You bet. Hard to do? You bet again, and

Experiments proved that standard installed oxygen equipment can be used for underwater breathing, provided that the mask is tightly fitted and the regulator is switched to 100 %.



★ WELL DONE ★



CAPT. METZROTH and CAPT. ROBERTS **809th ABG, Mac Dill AFB**

Captain Robert J. Metzroth was the IP on a B-29 with a student pilot in the left seat. While the student pilot was making a hooded instrument takeoff, number four engine ran away, but an airspeed of 120 mph had already been attained, and the aircraft was committed to takeoff. Attempts to control the engine with the propeller toggle switch were unsuccessful as the aircraft became airborne. Captain Metzroth had taken over control of the aircraft, and number four engine was feathered since it was overspeeding beyond design limits. At this time runaway turbos occurred on both number two and three engines.

Captain Metzroth was unable to gain altitude because of the limited power conditions, but a decision was made to avoid a crash landing, if possible, due to the congested area and rugged terrain. Landing gear and flaps were retracted and Metzroth was able to keep the B-29 airborne at an altitude of approximately 50 feet. Barely missing



CAPT. FRANK F. JENKINSON **3510th FTW, Randolph AFB**

It was a routine, in-flight refueling training mission. Captain Jenkinson was in the right seat of the KC-97 with a student pilot at the controls. Following 22 hookups, both wet and dry, Captain Jenkinson was informed that the B-47 recipient was going to drop back to exchange crew positions before resuming training. While waiting, Captain Jenkinson felt a severe impact.

He looked out the right window and saw that the B-47 was up close and had struck the tanker's right wing. The No. 4 propeller had received extensive damage, resulting in severe vibration throughout the aircraft. No. 4 was shut down and feathered but the vibration continued. It was assumed that the No. 3 propeller also had been damaged, and normal feathering procedure was carried out for that engine.

The tanker shuddered and fell off on the right wing at approximately 190 mph indicated. With the aid of the

it sounds great, but all the tests were made under ideal, controlled conditions. Things might be different if a pilot is faced with an actual ditching and has to go down with his aircraft."

There are two known cases, both involving Navy pilots, where the men went down with their aircraft, used their standard installed oxygen equipment, and got out okay.

One pilot, flying a Cougar, crashed into the water a short distance from his carrier. The aircraft hit at about a 45-degree angle of attack and sank immediately. The pilot got out of the plane after it had sunk about 15 feet and after being submerged for several minutes.

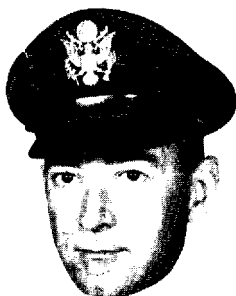
In relating how he got out he stated, "While I was struggling to clear the cockpit, I had 100 per cent oxygen on and could feel the positive pressure on my face."

Another pilot, flying a Panther, had a similar experience. His plane hit the water in a nose down attitude and sank in an inverted position. He was able to get out only because he was given enough additional time to disentangle himself from his aircraft as it was sinking. Without a good fit on his mask and the regulator on 100 per cent he would have drowned.

In describing his experience the pilot said, "After the initial shock of the crash, I opened my eyes and saw only white, foaming water. I reached with both hands to unfasten my safety belt and shoulder straps. While doing this, I experienced considerable turbulence and pressure on my eyes and ears. I thought I had cleared the cockpit after being tossed back and forth but my chute caught on something and pulled me deeper. Just as I started for the surface, I struck some part of the aircraft. I finally reached the surface and bobbed under again momentarily. I treaded water and began looking for the helicopter."

On the other hand, research has turned up some cases where it is definite that if the pilots involved had been aware of the full capabilities of their oxygen equipment they would have survived.

In one instance the pilot of a fighter lost his engine shortly after takeoff. It happened so quickly he was unable to retract his gear. The aircraft hit on the wheels, bounced and landed in a shallow pond. Upon contacting the surface, it flipped and landed on its back in about five feet of water. The canopy stuck and the pilot was unable to get out of the



Maj. Murray A. Wiener

Chief, Equipment Branch
Support Services Div., AFOTC

A native of New York state, Major Wiener has spent a large part of his life in the Arctic and Antarctic wastes.

During 1937-38 he was with the MacGregor Arctic Expedition in Northwest Greenland. 1939 saw him journeying to Little America with Rear Admiral Richard E. Byrd, and he didn't return to civilization until May of '41. Early in 1943 the Army Air Corps selected Wiener to establish a rescue organization for the North Atlantic Wing of ATC and this was followed by a similar chore for the Alaskan Wing.

The years of 1947-48 found him back in the Antarctic as an Air Force observer for the Navy's OPERATION HIJUMP, and following this little stint he went to the Alaskan Air Command as Chief, Arctic-Polar Branch where he officiated as project officer for a number of training films dealing with Arctic survival.

Finally, he managed to get to the ZI for a tour of duty and wound up in Hq USAF as Chief, Flying Services Branch, Support Services Division, DCS/D, and in November of 1952 was re-assigned to Eglin AFB.

plane. The crash crew was able to extricate the man in less than 15 minutes after the plane hit the water, but it was too late — he had drowned.

In a similar accident, the pilot of a World War II fighter ditched in a swampy area. The plane was observed to go down, and help arrived in a few minutes. When the rescuers arrived, they found that the plane was on its back in a few feet of water, with the canopy resting on the muddy bottom. Although the pilot was soon pulled from the water, he did not survive.

A third pilot, who ditched in the ocean, was more lucky. His plane sank immediately after ditching, but he was able to evacuate the aircraft at an estimated 30 to 40 feet. He believes that if he had known that his oxygen equipment would have enabled him to breathe under water, he could have gotten out much sooner. He commented, "I struggled furiously, trying to free myself from the cockpit. I remembered to hold my breath but felt frantic at being trapped in a sinking aircraft. I didn't take

the few seconds necessary to plan my actions — just tugged and pulled haphazardly to get free." He was fortunate to pull loose, although dragged deep enough to rupture an eardrum in the process.

In the first two instances the pilots could have been saved if the emergency underwater breathing technique had been discovered at the time of their accidents. And in the third case the pilot could have been spared a harrowing few minutes that he will never forget.

Incidentally, a word of warning to you skin diving aficionados. This equipment is not recommended for underwater fishing or diving. Salt water corrodes the regulator and will cause the rubber diaphragm to deteriorate after initial use. And this doesn't even consider the physiological aspects of using oxygen over long periods of time or the cost of the oxygen and equipment. The equipment is invaluable in an emergency but just don't try to use it to furnish the *piece de resistance* at a fish fry. ●

MEMORANDUM FOR THE RECORD

SUBJECT: Dilbert Dunker Training

1. The following individuals received Dilbert Dunker Training during the week of 17 - 20 September 1973 at NAS Miramer, California:



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102110Z AUG 73

CNO WASHINGTON DC

NAS MIRAMAR SAN DIEGO CA

INFO COMFIT/AEDWINGPAC

UNCLAS //NO1500//

SUBJECT: PHYSIOLOGY TRAINING SCHEDULE (U)

STAT

A. TELECON [REDACTED] YOUR CDR POSSOGLIA 9 AUG 73

B. THIS CONFIRMS THE REQUEST OF REFERENCE A THAT YOUR DILBERT
DUNKER BE MADE AVAILABLE 17-20 SEP 73.

STAT

DIRECT LIAISON WITH [REDACTED] AUTHORIZED.

OP-593

OP-593B

OP-593

OP-596C

OP-596S

DRAFTER: 593 / RELEASER 593

05 50 51 NCSC

CAPT M.D. CUNNINGHAM, OP-593, X56170

CAPT M.D. CUNNINGHAM, OP-543 X56170

M.D. Cunningham

UNCLASSIFIED

102110Z AUG 73

CONFIDENTIAL

Approved For Release 2003/08/21 : CIA-RDP75B00285R000100060001-4

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C O N F I D E N T I A L //NO1500//

PHYSIOLOGY TRAINING SCHEDULE {U}

25X1 A. TELECON [REDACTED] YOUR CDR ^{Marty} PASSOGLIA 17 APR 72

1. {C} THIS CONFIRMS THE REQUEST OF REFERENCE A THAT YOUR
DILBERT DUNKER BE MADE AVAILABLE 15-17 MAY 1972 FOR A
SPECIAL PROJECT. DIRECT LIAISON WITH [REDACTED] AUTHORIZED.

25X1

GP-4

DRAFTER: NRC

DIST: . 00.09.943.50

CDR J.W. TURLEY, OP-943E -X75832

CHOP LIST: 943B ^Σ

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